(No Model.) 2 Sheets—Sheet 1.

B. H. COFFEY.

APPARATUS FOR DREDGING OR PUMPING GRITTY FLUIDS.

No. 547,538. Patented Oct. 8, 1895.

Fig. 2.

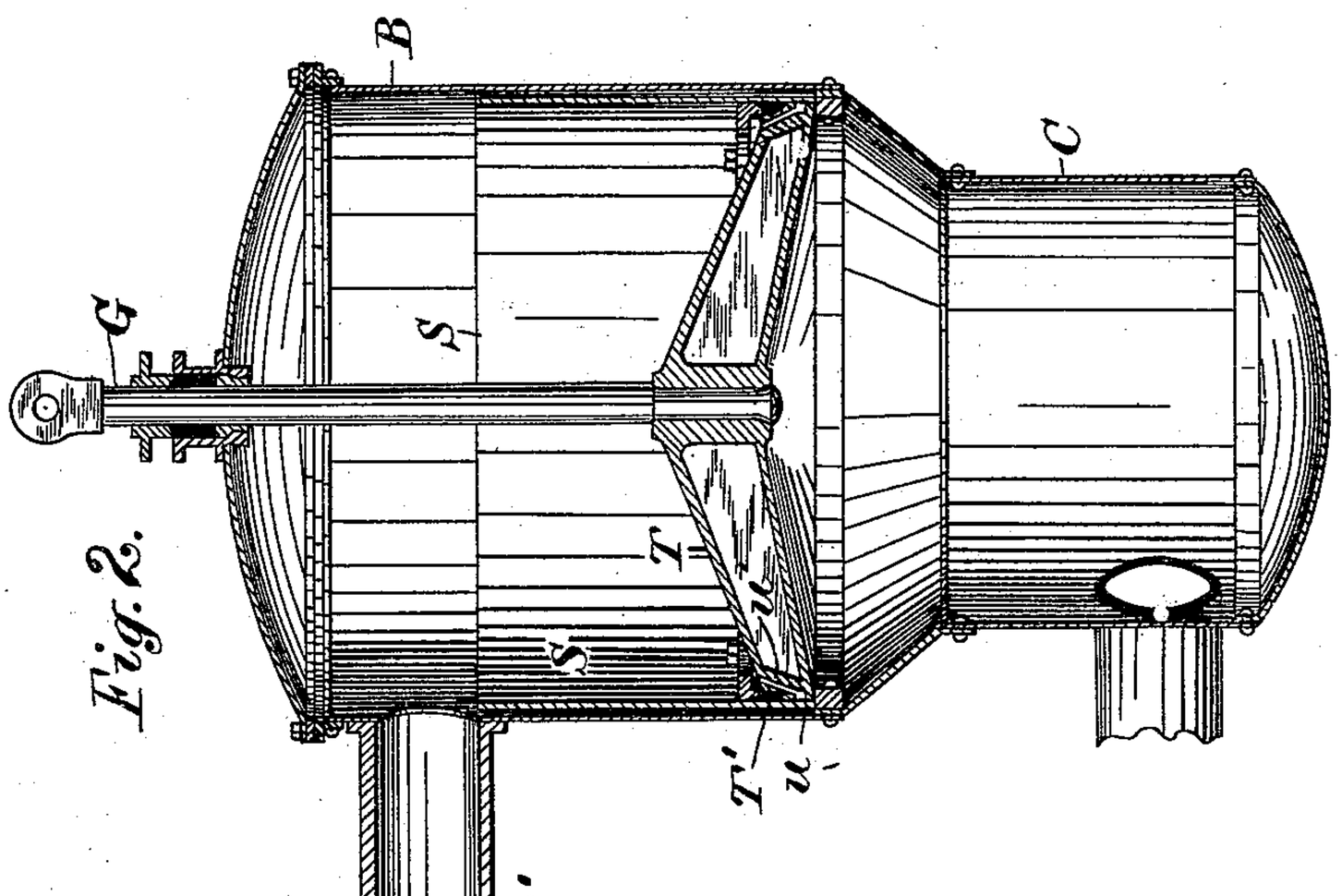
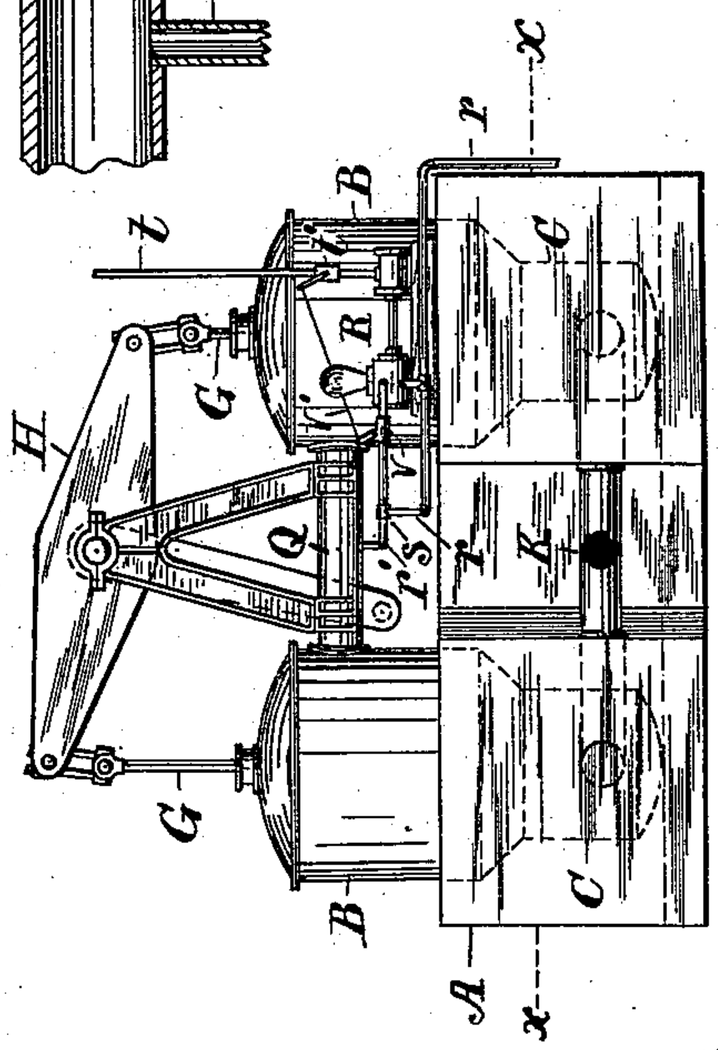


Fig. 1.



Attest:
Jacob Marx
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Inventor.
Barton H. Coffey,
per Thos. L. Craue, Atty.

(No Model.) 2 Sheets—Sheet 2.

B. H. COFFEY.

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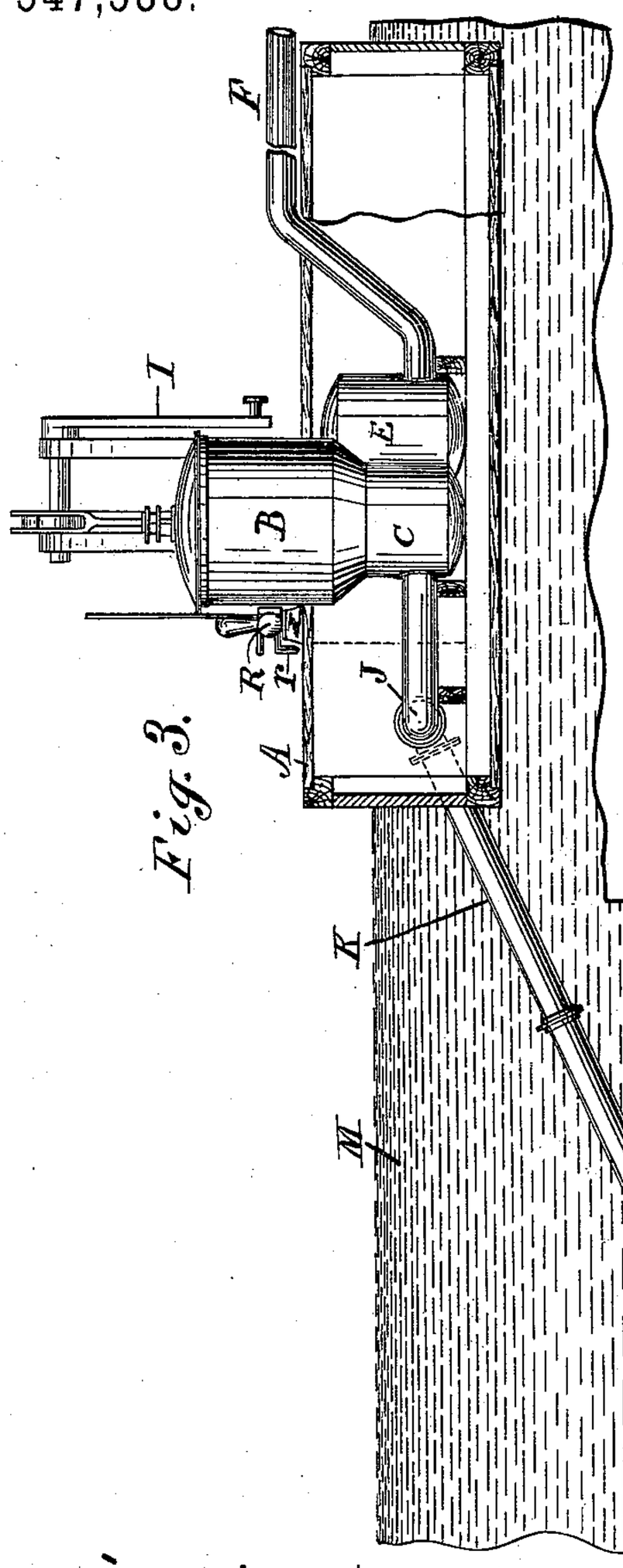

Fig. 3.

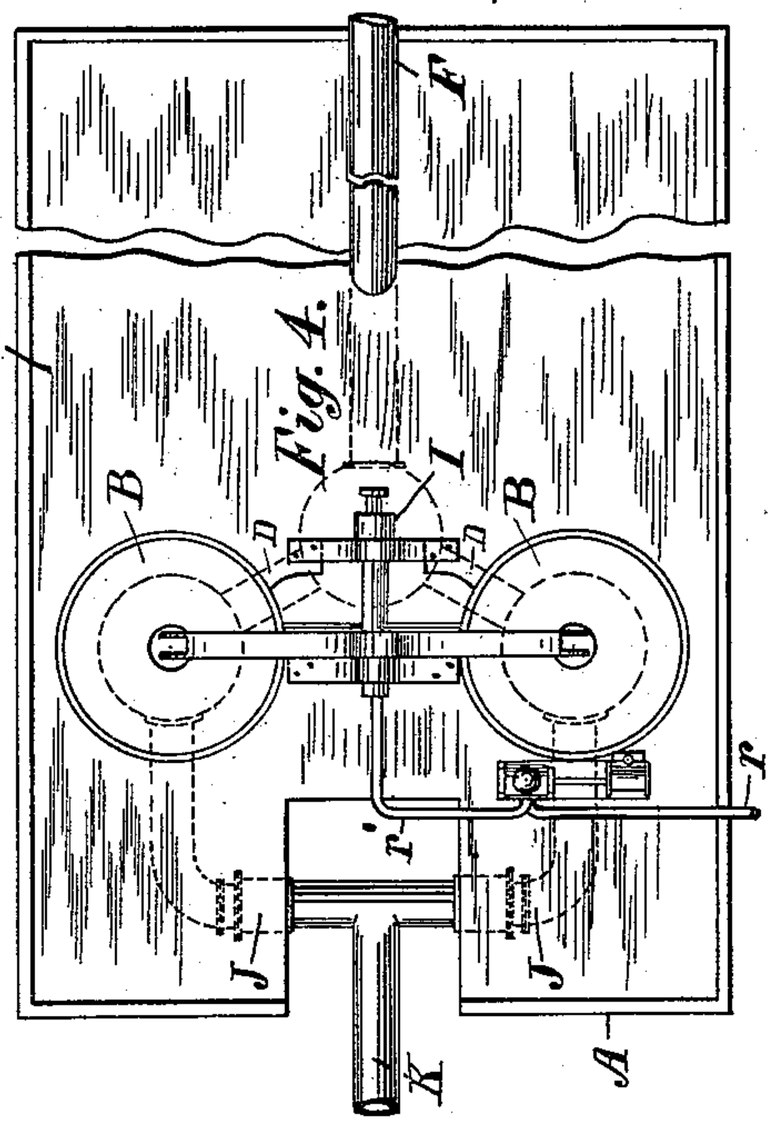

Fig. 4.

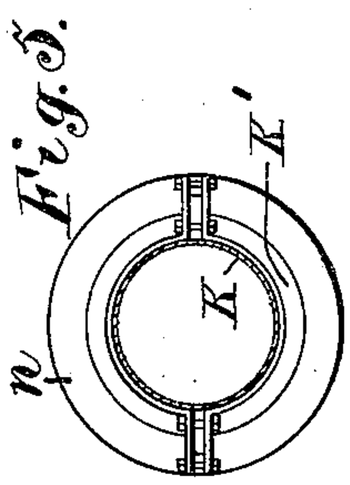

Fig. 5.

Fig. 6.

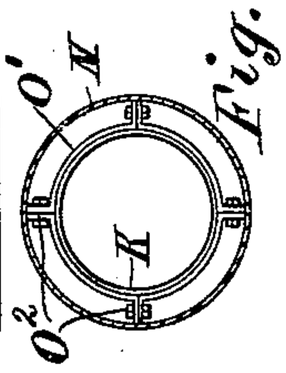

Fig. 7.

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L. Lee.
Edw. F. Kinsey.

Inventor:
Barton H. Coffey,
per Thomas S. Crane, Atty.

UNITED STATES PATENT OFFICE.

BARTON H. COFFEY, OF NEW YORK, N. Y.

APPARATUS FOR DREDGING OR PUMPING GRITTY FLUIDS.

SPECIFICATION forming part of Letters Patent No. 547,538, dated October 8, 1895.

Application filed November 16, 1894. Serial No. 528,976. (No model.)

To all whom it may concern:

Be it known that I, BARTON H. COFFEY, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Apparatus for Dredging or Pumping Gritty Fluids, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to facilitate the pumping of gritty fluids without clogging the suction-pipe or cutting the pump-cylinder by the intrusion of grit to the piston-packing. Heretofore two pistons have been connected together by a walking-beam and used for pumping gritty fluids by applying water-pressure alternately to their upper sides, the water being permitted to leak past the edge of the piston upon the downward stroke to wash the wall of the cylinder and prevent the intrusion of grit. Such a use of the water is available, because the water-pressure which actuates the piston is necessarily, in order to produce motion, greater than the resistance of the fluid below the same.

My present invention furnishes a means of washing the wall of the cylinder by a similar movement of the fluid in cases where the pistons are not actuated by hydraulic pressure, but by force applied to the piston-rod. To effect this result, I connect the space above the two pistons by a suitable water-channel and force into such channel continuously a sufficient supply of water to produce and to feed the flow past the edges of the pistons. As the pistons move in opposite directions by their connection through the walking-beam, the fluid above the pistons does not change in volume, but moves back and forth from one cylinder to the other through the water-channel.

I have shown my improvements diagrammatically in the annexed drawings, which illustrate two upright cylinders having their pistons connected by a walking-beam, which is provided with a lever-arm to which the power may be applied. The means for vibrating this lever-arm is not shown in the drawings, as it forms no part of the present invention.

The invention is shown applied to an apparatus for dredging in which the pumping devices are located upon a scow.

Figure 1 is an end elevation of the scow with the pumping apparatus. Fig. 2 is a vertical section of one of the pump-cylinders and the water-channel connected therewith. Fig. 3 shows the scow in longitudinal section floating in the water with the suction-pipe extended to the mud in the bottom and drawn in section at its lower end, the scow and discharge-pipe being broken for want of room, the water-level being shown by line *x x*. Fig. 4 is a plan of the same parts with the outer end of the suction-pipe broken off. Fig. 5 is a sectional plan of the suction-pipe, taken on line 5 5 in Fig. 6. Fig. 6 is an elevation of the suction-pipe with a section of the water-sleeve. Fig. 7 is a sectional plan of the suction-pipe on line 7 7 in Fig. 6.

A designates the scow; B, the cylinders of the dredging-pump, having the sand-chambers C at the bottom connected by pipes D with an air-chamber E. An outward discharge-pipe F is led from the air-chamber to discharge the sand and water at any suitable point. The piston-rods G are connected by walking-beam H, having lever-arm I, which may be vibrated by any suitable means, as a steam-engine and crank-gearing. The sand-chambers C are connected by swivel-joints J with the suction-pipe K, having its nozzle K′ turned downwardly to penetrate the mud, which is indicated at L in Fig. 1, at the bottom of the water-body M, in which the scow is supported.

Where the nozzle is inserted directly in the mud, silt, or sand, it is liable to settle therein and to become clogged, and I therefore furnish a means of supplying water to the mouth of the nozzle from the water-body above the bottom. Such means consists of a sleeve N sustained around the nozzle at a suitable distance therefrom and supplied with fluid from the water-body, the water entering at the upper end to feed the bottom of the nozzle with a suitable proportion of fluid. The sleeve forms an annular water-space K^2 around the nozzle, and so made adjustable, so as to project it more or less beyond the end of the nozzle to admit a greater or less proportion of water thereto, according to the character of the mud. To effect such adjustment I apply a clamp-collar O to the nozzle above the upper end of the sleeve and connect it to the top

of the same by adjusting-screws p, having nuts p' fitted to opposite sides of a flange n upon the top of the sleeve. The sleeve is centered around the lower edge of the nozzle by a clamp-collar O′, formed with lugs O^2, which project in different directions to the inner side of the sleeve, as shown in Fig. 7. The sleeve is made of greater length than the penetration of the nozzle into the mud, and its upper end is thus always exposed to the water, which thus readily flows into the top of the sleeve, as indicated by the arrows in Fig. 3, and mingles with the sand or mud at the bottom of the nozzle, the movement of the latter into the nozzle being represented by the arrows below the nozzle, where the nozzle and sleeve are shown in section to exhibit such movement. The greater the projection of the sleeve beyond the mouth of the nozzle the greater the proportion of water which would enter the nozzle with the sand or mud, and the degree of dilution may thus be regulated by suitably adjusting the sleeve.

In Fig. 1 the upper ends of the cylinders B are shown connected by a pipe or water-channel Q, and a steam-pump R is shown drawing water from the body M through a pipe r and delivering it into the channel Q by pipe r'.

The means for washing the wall of the cylinder is shown in Fig. 2, where one of the cylinders is shown in section, with the pipe Q forming the water-channel. The cylinder is shown with removable lining S, having piston T fitted thereto, with a fibrous packing T′ at the upper part of its periphery, and a water-groove u formed in the edge of the piston below the same. Holes u' are extended from the groove to the upper side of the piston, and the edge of the piston below the water-level is made to slightly clear the wall of the cylinder to permit a thin film of water to escape downwardly. As already stated, the volume of water above the pistons in the two cylinders and the channel Q is unchanged by the alternate motion of the pistons, and the movement of a film of water downward from the groove u in each of the pistons can thus be produced by maintaining above the pistons T an excess of pressure over that which is required below the pistons to discharge the fluid from the sand-chambers C. The pump R is operated to maintain such excess of pressure in the upper parts of the cylinders B by delivering a fixed volume of fluid through the pipe r' while the pistons T are in motion. To prevent any over-pressure in the cylinders B, which would needlessly strain the same, a loaded safety-valve may be applied to the pipe r' or the channel-pipe Q, or a by-pass valve, which is indicated diagrammatically at s in Fig. 1, may be inserted in the pipe r' and connected with the suction-pipe r, thus delivering back to the suction of the pump the excess of fluid from the pipe Q. A steam-pipe t is shown connected with the power-cylinder of the pump R, and a throttle-valve t' is shown inserted in the same, which may be governed by a pressure-regulator inserted in the pipe r', such regulator being diagrammatically indicated and designated by the letter v and connected by link v' with the lever of the valve t'. By such construction the pressure-regulator would control the speed of the pump, and any excess of pressure above the pistons T may be automatically prevented.

It is obvious that the grit in the fluid below the pistons T would, during the downward or forcing stroke, tend very forcibly, if not balanced by a pressure above the pistons, to crowd upward into the fibrous packing T′, and thus cause a cutting of the cylinder-walls. By maintaining a pressure above the pistons in excess of the maximum pressure below the same, I wholly prevent such upward movement of the gritty particles, and I also secure a downward movement of the clean fluid past the edge of the piston, which forces the grit before the same during the downward stroke.

The improvements described enable me to control the flow of the gritty material into the sand-chambers C, while they also prevent injury to the cylinder in pumping such material.

Heretofore in the sand-pumps used in well-boring apparatus it has been common to make the shell of the sand-pump double, with an intermediate space to admit water below the valve, to prevent the formation of a vacuum when the sand-pump is lifted. In my construction no valve is used and no means is required to break the vacuum. The adjustable nozzle N differs from such prior constructions in being adjustable to admit a variable quantity of fluid, and it differs from the telescopic construction, which is sometimes used in movable tubes, in requiring an internal guide, which is furnished herein by the lugs O^2, projected from different sides of the nozzle in such a relation to the sleeve as to support and center it in every required position. In operating with such nozzle it is customary to move the nozzle about in the bed of mud or sand to draw the material from all parts of the bed, and this is often effected by swiveling the suction-pipe or swiveling the dredging-boat upon a spud; but the means for effecting such movement is not shown herein, as it forms no part of the present invention.

Having thus set forth the nature of my invention, what is claimed herein is—

1. The method of preventing the access of grit to pistons, in pumping gritty fluids within two cylinders connected by a channel above the pistons, and having pistons constructed to discharge a film of water past their peripheries, and the pistons moved by means of piston rods in opposite directions, which consists in forcing water simultaneously into both cylinders above the pistons with a pressure exceeding the resistance below the same.

2. In a sand pump, the combination, with two cylinders having pistons arranged to move in opposite directions and constructed

to discharge a film of water past their peripheries, of a pipe or channel connecting the cylinders above the pistons, and means for forcing water simultaneously into the cylinders above the pistons, substantially as set forth.

3. In a sand pump, the combination, with two cylinders having pistons arranged to move in opposite directions and constructed to discharge a film of water past their peripheries, of a pipe or channel connecting the cylinders above the pistons, a pipe for supplying water to the cylinders or channel under pressure, and means for limiting or controlling the water pressure, as set forth.

4. In a sand pump, the combination, with two cylinders having pistons arranged to move in opposite directions and constructed to discharge a film of water past their peripheries, of a pipe or channel connecting the cylinders above the pistons, and means, as a force pump connected by a pressure pipe to the channel Q and relief valve *s*, for maintaining a regulated pressure above the pistons in excess of the resistance below the same, substantially as herein set forth.

5. In a sand pump, the combination, with two cylinders having pistons constructed to discharge a film of water past their peripheries, and having their piston rods connected to and actuated by a walking beam, of a pipe or channel connecting the cylinders above the pistons, and means for forcing water simultaneously into the cylinders above the pistons, substantially as herein set forth.

6. In a dredging apparatus, the combination, with the suction pipe K having a straight section to form the nozzle K′ at the end, of the sleeve N surrounding the nozzle with intermediate annular water space K^2, a guide to center the sleeve when moved upon the nozzle, and the means for adjusting the sleeve longitudinally upon the nozzle to admit a constant flow of water to mingle with the sand or mud at the nozzle, substantially as herein set forth.

7. In a dredging apparatus, a suction pipe having the nozzle K with collar O′ having lugs projected therefrom, the sleeve N fitted to move over such lugs, the collar O attached to the nozzle above the sleeve and connected thereto by adjusting screws, the sleeve having its upper end open and operating to admit a constant flow of water to mingle with the sand or mud at the nozzle, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

BARTON H. COFFEY.

Witnesses:
AMASA J. PARKER, Jr.,
JNO. J. HUGHES.